SN74HC595(N) Shift Register

As the monitoring station should be more or less self-sustainable later on, an important factor to consider is the power consumption of the devices. There are different sources of power losses that drain the batteries of the station over time. One such loss is the current that flows through the VDD pins to GND in the sensors while they are not used. This power loss could be lowered if the power supply would be just activated when the sensor is actually in use.

This could be done using a simple transistor. However, with a transistor, one GPIO pin of the MCU would be used for each device that is powered individually. When the number of sensors increase, the available GPIOs rapidly decrease. The same would be true for directly using GPIOs to power the sensors which should always be avoided; one reasons for that is, that the GPIOs can only supply a low current and do not have as stable voltage levels as the 3.3V pin.

Another method is to use a shift register, such as the SN74HC595 (figure 1). That is a small integrated circuit (IC) which transforms a digital serial input into a digital parallel output. The SN74HC595 contains a shift register and a storage register of the size of 1 byte and possesses 8 parallel output pins. To operate the device 3 GPIO pins of the MCU are needed, one pin for transmitting the data (data, DS, SER), one pin for the clock signal of the shift register (clock, SHCP, SRCLK) and another one as clock signal for the storage register (latch, STCP, RCLK). The advantage of the shift register is that with only 3 GPIO pins, 8 output pins can be controlled at the same time individually. Furthermore, the IC has another output for serial data which can be connected to the serial input (data pin) of another shift register. This allows for the cascading, that means connecting many ICs in series, of the SN74HC595; so, with only 3 pins a large number of outputs can be managed.

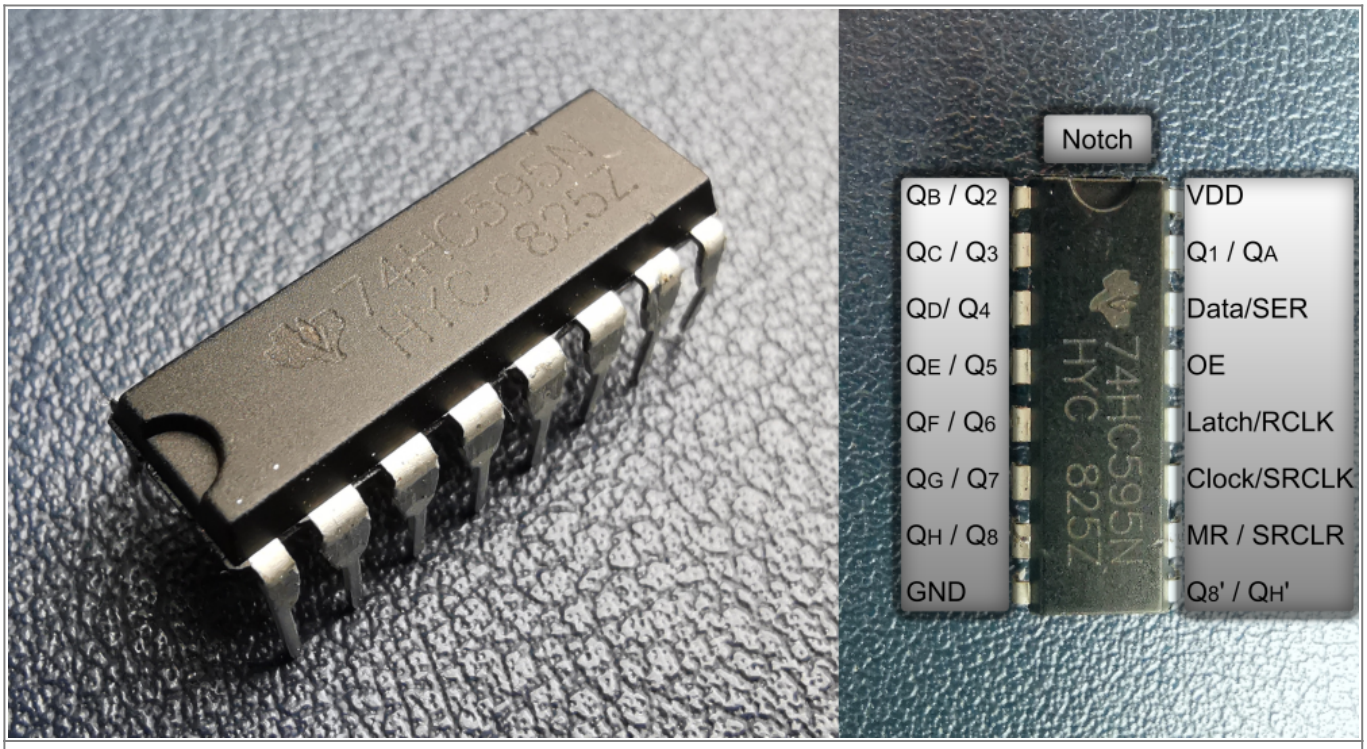

Figure 1 SN74HC595(N) Shift Register and pinout.